

WHAT IS CLAIMED IS:

1. A hybrid transmission comprising:

a housing having a common axis defined thereby, the housing being adapted to be positioned beside an engine when the hybrid transmission is mounted on a motor vehicle;

a differential speed change unit installed in the housing at a position near the engine and arranged coaxial with the common axis;

a two-rotor type motor/generator unit installed in the housing at a position away from the engine and arranged coaxial with the common axis, the motor/generator unit having inner and outer rotors;

an inner rotor shaft connected with the inner rotor to rotate therewith, the inner rotor shaft being hollow and coaxial with the common axis and extending to the differential speed change unit to be operatively connected to the same; and

an outer rotor shaft rotatably received in the hollow inner rotor shaft and extending to the differential speed change unit to be operatively connected to the same, the outer rotor shaft being connected to the outer rotor through a circular drive plate which is positioned at one axial end of the motor/generator unit that is opposite to the other axial end that faces the differential speed change unit,

wherein an outer rotor assembly substantially consisting of the outer rotor, the circular drive plate and the outer rotor shaft is rotatably supported in the housing by means of at least three supporting members.

2. A hybrid transmission as claimed in Claim 1, in which a structurally larger part of the outer rotor assembly which substantially consists of the outer rotor and the circular drive plate is rotatably supported by two of the supporting members, and a structurally smaller center part of the outer rotor assembly

which substantially consists of the outer rotor shaft is rotatably supported by the remaining one of the supporting members.

3. A hybrid transmission as claimed in Claim 1, in which the
5 circular drive plate is formed at its diametrically center portion with a cylindrical hub portion in which an axial end portion of outer rotor shaft is concentrically received through a spline connection.
- 10 4. A hybrid transmission as claimed in Claim 3, in which the circular drive plate is formed near the cylindrical hub portion with a swing permission structure through which the outer rotor shaft is permitted to make a swing about the axially end portion thereof.
- 15 5. A hybrid transmission as claimed in Claim 4, in which the swing permission structure is possessed by a radially inner portion of the circular drive plate, the radially inner portion having a zigzag cross section.
- 20 6. A hybrid transmission as claimed in Claim 4, in which the outer rotor shaft and the circular drive plate are arranged to have a swing promotion structure through which the swing movement of the outer rotor shaft is promoted.
- 25 7. A hybrid transmission as claimed in Claim 6, in which the swing promotion structure comprises:
an annular ridge formed about the axially end portion of
outer rotor shaft, the annular ridge being in contact with an
30 cylindrical wall of the cylindrical hub portion of the circular drive plate;

an annular groove formed in and around the axially end portion of outer rotor shaft in the vicinity of the annular ridge; and

an O-ring received in the annular groove.

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8. A hybrid transmission as claimed in Claim 1, in which the housing is provided with a diametrically reduced portion at a position between the differential speed change unit and the motor/generator unit, and in which a wiring from the
10 motor/generator unit is exposed to a space between the motor/generator unit and the differential speed change unit and led and exposed to the outside of the housing through an opening formed in the diametrically reduced portion.

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9. A hybrid transmission as claimed in Claim 8, further comprising cooling water passages which are formed in a wall portion of the housing to let a cooling water flow therethrough for cooling a stator of the motor/generator unit.

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10. A hybrid transmission as claimed in Claim 9, in which the wall portion of the housing is provided with a bearing holder which has a center opening through which the inner and outer rotor shafts pass, and in which the stator of the motor/generator unit is fixed to the bearing holder.

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11. A hybrid transmission as claimed in Claim 10, in which the bearing holder has a cooling water passage that is merged with the cooling water passage of the wall portion of the housing.

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12. A hybrid transmission comprising:
a housing having a common axis defined thereby, the housing being adapted to be positioned beside an engine when the hybrid transmission is mounted on a motor vehicle;

a differential speed change unit installed in the housing at a position near the engine and arranged coaxial with the common axis;

5 a two-rotor type motor/generator unit installed in the housing at a position away from the engine and arranged coaxial with the common axis, the motor/generator unit having inner and outer rotors and a wiring;

10 an inner rotor shaft connected with the inner rotor to rotate therewith, the inner rotor shaft being hollow and coaxial with the common axis and extending to the differential speed change unit to be operatively connected to the same; and

15 an outer rotor shaft rotatably received in the hollow inner rotor shaft and extending to the differential speed change unit to be operatively connected to the same, the outer rotor shaft being connected to the outer rotor through a circular drive plate which is positioned at one axial end of the motor/generator unit that is opposite to the other axial end that faces the differential speed change unit,

20 wherein an outer rotor assembly substantially consisting of the outer rotor, the circular drive plate and the outer rotor shaft is rotatably supported in the housing by means of three supporting members, and

25 wherein a structurally larger part of the outer rotor assembly which substantially consists of the outer rotor and the circular drive plate is rotatably supported by two of the supporting members, and a structurally smaller center part of the outer rotor assembly which substantially consists of the outer rotor shaft is rotatably supported by the remaining one of the supporting members.

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13. A hybrid transmission comprising:

a housing having a common axis defined thereby, the housing being adapted to be positioned beside an engine when

the hybrid transmission is mounted on a motor vehicle, the housing having a diametrically reduced portion by which the housing is divided into a first housing part which is positioned near the engine and a second housing part which is positioned
5 away from the engine;
a differential speed change unit installed in the first housing part and arranged coaxial with the common axis;
a two-rotor type motor/generator unit installed in the second housing part and arranged coaxial with the common axis,
10 the motor/generator unit having inner and outer rotors and a wiring;
an inner rotor shaft connected with the inner rotor to rotate therewith, the inner rotor shaft being hollow and coaxial with the common axis and extending to the differential speed change unit
15 to be operatively connected to the same; and
an outer rotor shaft rotatably received in the hollow inner rotor shaft and extending to the differential speed change unit to be operatively connected to the same, the outer rotor shaft being connected to the outer rotor through a circular drive plate which
20 is positioned at one axial end of the motor/generator unit that is opposite to the other axial end that faces the differential speed change unit,
wherein an outer rotor assembly substantially consisting of the outer rotor, the circular drive plate and the outer rotor shaft
25 is rotatably supported in the housing by means of at least three supporting members, and
wherein the wiring of the motor/generator unit is exposed to a space between the differential speed change unit and the motor/generator unit and led and exposed to the outside of the
30 housing through an opening formed in the diametrically reduced portion of the housing.